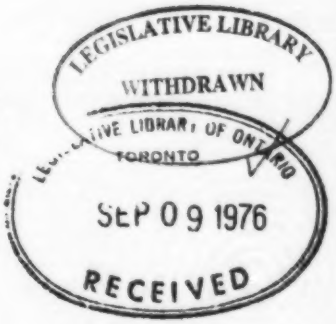
FIRST

ANNUAL REPORT

1975



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Alberta ENVIRONMENT

Environment Canada | Environnement Canada

Penthouse, Jarvis Building
9925 - 107 Street
Edmonton, Alberta T5K 2H9
Phone 403/427-3943

The Alberta Oil Sands Environmental Research Program was established in 1975 by agreement between the Ministers of the Environment for Alberta and Canada.

It is a multidisciplinary research program involving scientific research expertise from both the governments of Alberta and Canada, Alberta universities and private industry, with a mandate to investigate the possible effects of development in the Athabasca oil sands upon the renewable resources of the natural environment.

Additional copies of this First Annual Report of the Alberta Oil Sands Environmental Research Program are available upon request to

AOSERP
9925 - 107 Street
Edmonton, Alberta T5K 2H9
403 (427-3943)

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LETTER OF TRANSMITTAL

The Hon. D. J. Russell
Minister of the Environment
Legislative Building
Edmonton, Alberta

and

The Hon. J. Marchand
Minister of the Environment
Parliament Buildings
Ottawa, Ontario

Sirs:

Enclosed herein is the First Annual Report of the Alberta Oil Sands Environmental Research Program, for the year April 1, 1975 to March 31, 1976.

This document reports on the initiation, planning procedures, and commencement of this joint federal-provincial enterprise, investigating the environmental effects of development in the Athabasca oil sands, as set out in the Alberta-Canada Agreement of February 28, 1975.

Most respectfully,

E. E. Ballantyne, D.V.M.
Steering Committee, AOSERP
Executive Director, Special
Environmental Projects

Dr. J. S. Tener, Member
Steering Committee, AOSERP
Assistant Deputy Minister
Environmental Management Service
Environment Canada

MESSAGE FROM THE STEERING COMMITTEE CHAIRMAN

The Alberta Oil Sands Environmental Research Program (AOSERP) was created in February 1975, when the Ministers of the Environment for Alberta and Canada signed an agreement outlining the mandate, goals, procedures, and funding for a massive research effort into the environmental effects of development in the Athabasca oil sands.

This commitment to provide monies for environmental research stemmed from an awareness of the importance the public placed on sound development methods and policies in the Athabasca oil sands. The Agreement provided the opportunity for a coordinated program encompassing the total environmental sphere, involving air, land, water, and people. Eight Technical Research Committees were established, each with a special relationship to a particular federal or provincial department or agency, as listed in the project reports.

The Program has both federal, provincial, and industry involvement, because many of the areas being investigated coincide with already-existing capabilities and responsibilities which are dependent on increased levels of knowledge of the environment in the region. The ability to utilize people with experience in both research and regulation provides even greater direction and relevance to the projects proposed and undertaken. This should greatly increase the value to the end users in government and industry, who will provide the basis for a balance between resource development, environmental protection, and the quality of life, with a firm emphasis on prevention of irreversible environmental damage.

ORGANIZATION OF THE PROGRAM

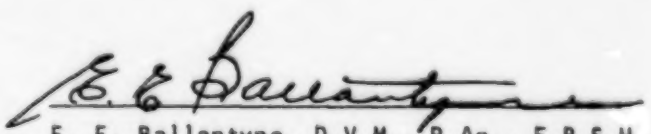
AOSERP is managed by Alberta Environment, and functions according to the pattern on page 8. The Steering Committee reports to the Alberta and Canada Ministers of the Environment, and receives general program approval from the Ministerial level. This general approval for the Program's yearly operations is then transmitted by the Steering Committee to the Program Director, with the purpose of providing coherence and direction to the overall Program. Through the Program Director's office, duplication is avoided and coordination among the research projects of the eight Technical Research Committees is achieved. The Steering Committee held 26 meetings during this first year.

Involvement with the novel and exciting developments in Alberta's north over the past year has been most rewarding, especially as AOSERP became almost fully operational in this first year. The Program has great potential, and the benefits of governmental, industry, university, and private consultant cooperation will be felt long after the Program has fulfilled its goals. This is a Program with great benefits for future Albertans and Canadians, as it provides a firm scientific basis on which to formulate sound development decisions in keeping with good environmental protection measures.

Due to heavy involvement in other programs in the development stage, the undersigned Chairman relinquished this position to Mr. W. Solodzuk, Deputy Minister of Alberta Environment, on 31 March 1976.

Sincere appreciation is expressed for the mature counsel of the Honourable W. J. Yurko and the Honourable D. J. Russell, and for the dedication and progressive involvement of Dr. J. S. Tener, Dr. A. H. Macpherson, Mr. M. G. Pahl, and the Chairmen, who cooperated by making their Technical Research Committees operational.

It was an honor and a privilege to be associated with the Program from inception to becoming an operational unit.



E. E. Ballantyne, D.V.M., P.Ag., F.R.S.H.
Chairman, Steering Committee, AOSERP
1975-76

REPORT OF THE PROGRAM DIRECTOR

The Alberta Oil Sands Environmental Research Program was established to undertake environmental research relative to the renewable resources of the Athabasca oil sands area. It will make information available to government and industry to ensure an acceptable quality of the environment during and after operations for the recovery, transport, and processing of oil sands products. This research will be directed to the solution of practical social and technical environmental problems resulting from oil sands development. Thus the Program will provide more scientific data to enable governments and industry to do a better job in the future management of the area as it develops by meeting the standards and services required for legislation such as: The Clean Air Act, The Clean Water Act, The Migratory Birds Convention Act (Canada), The Wildlife Act, The Fisheries Act (Canada), The Forests Act, The Land Surface Reclamation and Conservation Act, and other statutes.

ORGANIZATION

The two-member Steering Committee was appointed by the Ministers of Environment for Alberta and Canada and given responsibility for the composition, coordination, and conduct of the Program.

The Advisory Committee on Program Coordination includes Technical Research Committee Chairmen, a representative from industry's Oil Sands Environmental Study Group (OSESG), and a person representing Alberta's universities. This Committee provides advice to the Program Director on such matters as coordination and budget allocations.

The eight Technical Research Committees (TRC) outlined in the Agreement were directed by the Steering Committee to identify research requirements, propose projects thereto, and to administer approved projects. (The AOSERP organization chart is on page 8 and the Committees are listed on pp. 57, 58 of this report.)

Each Committee is composed of technical experts from government, industry, and universities, with expertise relevant to the Committee's subject matter. Approved Committee research projects are directed by a projects leader as the implementor for the Research Committee and Program management.

Overall research coordination and common support services are provided by a small Program management team composed of a director, two

research coordinators, a field manager, a Program administrator, and support staff.

PLANNING AND ORGANIZATION TO DATE

This report summarizes the first year of the Program, in which planning and organizing received the main emphasis. Where possible, staff of existing line agencies in both levels of government were used. Where the expertise was not available, universities and consultants were used on a contract basis. The division of work was approximately 50%--governments, 25%--universities, and 25%--consultants. The function of Program management is to organize and provide for common services to coordinate and integrate the research projects into a comprehensive multidisciplinary Program.

As a starting point, an operations plan was developed in April 1975, with six arbitrarily assigned first-year objectives:

1. to receive approval for research projects;
2. to establish a Program coordination and administrative capability;
3. to design in detail ongoing research projects;
4. to assist project mobilization where required by detailed planning, recruiting and staffing, and provision of resources;
5. to establish some level of field support for all projects;
6. to satisfy the federal/provincial Agreement requirement regarding reporting.

Objective 1: to receive approval for research projects

When AOSERP was approved in principle, the eight Technical Research Committees had a total of 28 major research projects divided into 73 subprojects, of which 56 received funding approval. Status details are included in the Committees' reports, beginning on page 9 of this document.

Objective 2: to establish a Program coordination and administrative capability

The Program management staff consists of nine people, including secretarial and field management staff. Seven of the eight Technical Research Committees have a projects leader to manage the work for the Committee. Coordination and the avoidance of duplication was achieved through the Program management office and by the assistance of the Advisory Committee on Program Coordination.

Objective 3: to design in detail on-going research projects

Program management office and the Technical Research Committee Chairmen prepared 10-year project schedules for each Committee, which were amalgamated into a total 10-year Program study schedule. This process assisted in eliminating duplication and research overlaps in the first year, as evidenced by the funding of 56 out of 73 proposed research sub-projects.

Objective 4: to assist project mobilization where required by detailed planning, recruiting and staffing, and provision of resources

This objective is related to Objective 2. It aided the progress of the total Program by staffing the project leader positions, assisting the Technical Research Committees in the selection and hiring of consultants, and in establishing workable arrangements with Alberta universities.

Objective 5: to establish some level of field support for all projects

In mid-May, with Legislative approval of funds, a helicopter was obtained on long-term charter for field support, and a temporary field camp was rented. The temporary field camp, capable of housing 24 people, was located near Mildred Lake in July. A 135-acre research area on a 10-year renewable lease from Syncrude Canada Ltd. is now the permanent site for a 64-person field camp and research facility, ready for the 1976 field research season.

A field manager was located in Fort McMurray in May to establish the support services and assist field researchers.

Objective 6: to satisfy the federal/provincial Agreement requirement regarding reporting

This First Annual Report of the Program is a summary of the past year's activities and progress. Reports for individual research projects will be issued as completed. The Steering Committee and Program Director reported to a Federal interdepartmental group in Ottawa in March 1976. There is continuing liaison with the Alberta departments involved as user agencies.

FUNDING

Alberta, as the managing government, committed $2,500,000 to the Program; Canada committed $2,000,000. From this total funding commitment, Alberta expenditures amounted to nearly $2,500,000, and Canada expended

about $1,000,000 for a total expenditure of approximately $3,500,000 on research and equipment in this start-up year.

The time of initiation and growth is always an exciting period. The first year of the Alberta Oil Sands Environmental Research Program has been vital, constantly challenging, and productive.

Progress was made by various scientists in various disciplines by studving the same areas in a cooperative and coordinated way, to obtain the fullest benefit from the Research Program.

The impact of these findings will be felt for centuries by Albertans and Canadians.

Milt G. Pahl

Milt G. Pahl
Program Director

ALBERTA OIL SANDS
ENVIRONMENTAL RESEARCH PROGRAM
STUDY AREA

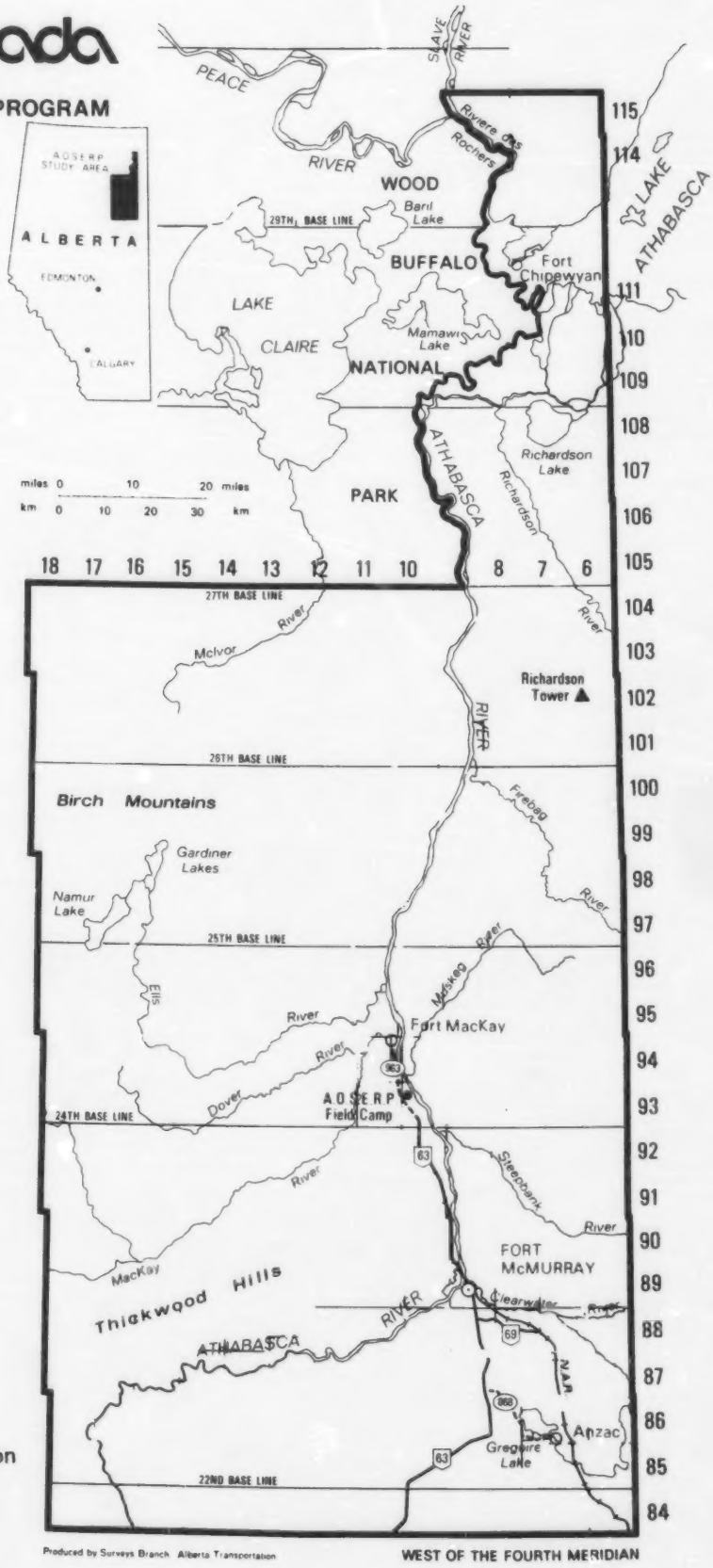


FIGURE 1. AOSERP study area location

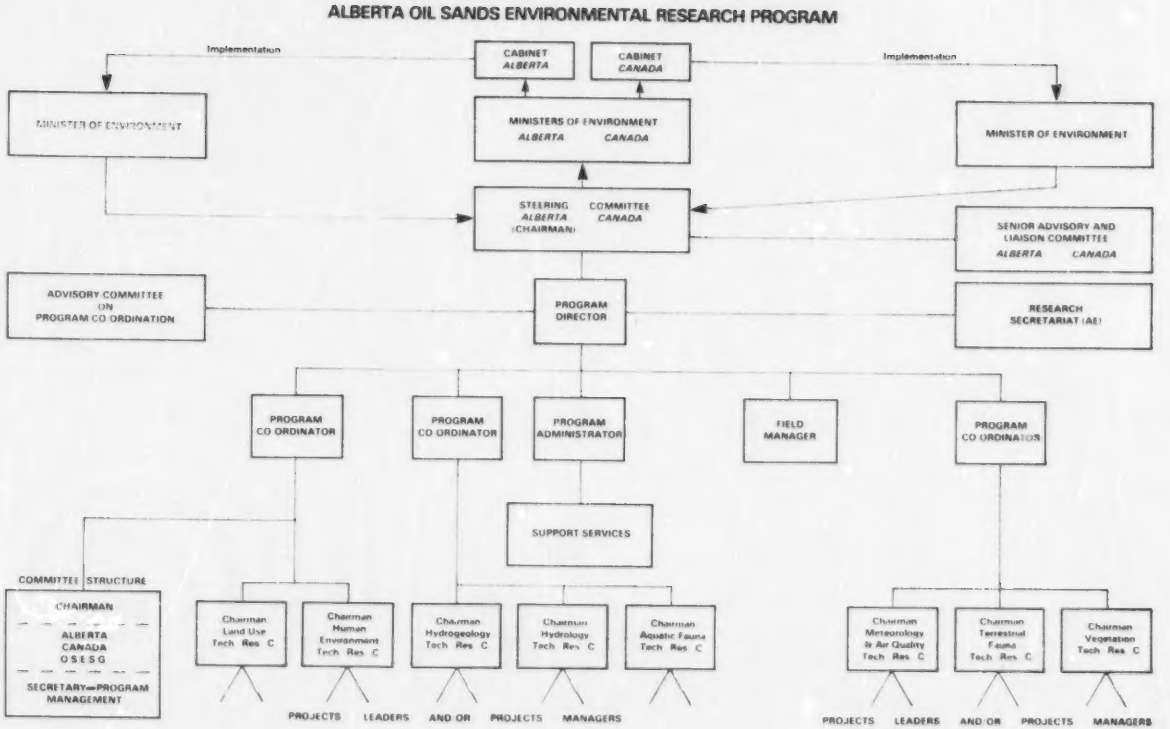


FIGURE 2. AOSERP Organization Chart.

REPORTS OF THE TECHNICAL RESEARCH COMMITTEES FOR 1975-76

AQUATIC FAUNA TECHNICAL RESEARCH COMMITTEE

HUMAN ENVIRONMENT TECHNICAL RESEARCH COMMITTEE

HYDROGEOLOGY TECHNICAL RESEARCH COMMITTEE

HYDROLOGY TECHNICAL RESEARCH COMMITTEE

LAND USE TECHNICAL RESEARCH COMMITTEE

METEOROLOGY AND AIR QUALITY TECHNICAL RESEARCH COMMITTEE

TERRESTRIAL FAUNA TECHNICAL RESEARCH COMMITTEE

VEGETATION TECHNICAL RESEARCH COMMITTEE

Office of the Chairman

AQUATIC FAUNA
TECHNICAL RESEARCH COMMITTEE

ALBERTA OIL SANDS
ENVIRONMENTAL RESEARCH PROGRAM

25 March 1976

Mr. M. G. Pahl, Director
Alberta Oil Sands
Environmental Research
Program

Dear Mr. Pahl:

Re: Aquatic Fauna Technical Research Committee
Goals and Progress, 1975-76

During the past year the Aquatic Fauna Committee has devoted considerable attention to the clear definition of priorities and objectives for research. This process has included the formulation of a 10 year plan for research and the convening of the Expert Advisory Group. In addition, the Committee has placed these documents in a summary "Aims and Objectives" booklet.

Although A.F.T.R.C. did not expend the 1975-76 budget, as a result of time devoted to definition and planning of research, a full slate of studies encompassing toxicology, freshwater ecology, fish resources and lake acidification/heavy metals cycling are planned for 1976-77.

I would like to acknowledge the contribution made to the Program by the members of my Technical Committee and associated research scientists all of whom have represented Federal and Provincial agencies, Universities and Industry. Their hard work and far-sighted approaches to research have made an invaluable contribution to the Program.

I look forward to a continually expanding interest and productivity of research as the AOSER Program moves forward.

Yours truly,

Ron R. Wallace, Ph.D
Chairman & Projects Leader
Aquatic Fauna Committee
AOSERP

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Environnement Canada

AQUATIC FAUNA TECHNICAL RESEARCH COMMITTEE

RESEARCH ACTIVITIES, 1975-76

SUB-PROJECT TITLE
AND DESCRIPTION: AF 1.1.1 Aquatic Environmental Toxicology Research--Inventory Phase

This project is to study an existing operation in the oil sands area in order to accurately characterize the toxicity to fish and aquatic invertebrates of the various effluents from the extraction and refining process, in order to provide a basis for future toxicity research.

RESPONSIBLE AGENCY
AND RESEARCHER: Alberta Environment, Pollution Control Division. W. Lake

STATUS REPORT:

Work has proceeded to the point where final plans are being made for site studies on effluents from the Great Canadian Oil Sands operation. The sub-project is now being coordinated into a wider program of toxicity studies under the direction of the interim toxicology project manager, Dr. J. Klaverkamp.

SUB-PROJECT TITLE
AND DESCRIPTION: AF 1.2.1 Saline Waters Literature Review

A review of the existing literature with respect to the impact of saline waters upon temperate freshwater biota is being undertaken.

RESPONSIBLE AGENCY
AND RESEARCHER: Environment Canada, Freshwater Institute.
Aquatic Environments Ltd., Calgary

STATUS REPORT:

The review has been completed, and a final report will be submitted to the Aquatic Fauna Committee early in the year.

SUB-PROJECT TITLE
AND DESCRIPTION: AF 2.1.1 Synoptic Survey of Baseline Levels of Contaminants in Aquatic Fauna

The general purpose of the field program is to collect fish, invertebrate, sediment, and water samples in the AOSERP study area. These samples will be used to provide baseline information on levels of contaminants in the aquatic fauna of the region. Ten sample sites (five in the Fort Chipewyan region and five in the Fort McMurray area) were initially sampled, with an additional five sites south of Fort McMurray being sampled subsequent to the completion of work on the initial sample areas.

RESPONSIBLE AGENCY
AND RESEARCHER: Environment Canada, Freshwater Institute, Winnipeg
Renewable Resources Ltd., Edmonton

STATUS REPORT:

The contract has been completed, and the samples are now being analyzed at the Freshwater Institute for contaminants. A final report from the Institute is expected within the first half of the new fiscal year.

SUB-PROJECT TITLE
AND DESCRIPTION: AF 2.2.1 Macroinvertebrate Analysis from the Athabasca River

A series of Ponar and artificial substrate samples were taken in the Athabasca River in Summer 1974. These samples will provide useful background information on the taxonomy and basic biology of the aquatic invertebrates of the area. The Invertebrate Culture and Toxicology Group of the Freshwater Institute attempted in several ways to measure lethal or sublethal short term effects of the Athabasca blackfly control treatment on the aquatic invertebrates of the system.

RESPONSIBLE AGENCY
AND RESEARCHER: Environment Canada, Freshwater Institute, Winnipeg
Dr. J. Flannagan

STATUS REPORT:

The identification of macroinvertebrates collected from the Athabasca River is progressing as planned. A final report is expected within the first half of the new fiscal year.

SUB-PROJECT TITLE
AND DESCRIPTION: AF 3.1.1 Background information for the Aquatic Fauna Technical Research Committee

This survey of literature and research, both completed and ongoing, that related to the aquatic fauna of the AOSERP region was requested to provide the Committee members with an overview of the "state of the art".

RESPONSIBLE AGENCY
AND RESEARCHER: Environment Canada, Freshwater Institute, Winnipeg
Renewable Resources Ltd., Edmonton

STATUS REPORT:

This contract is now complete. The two final reports, entitled, "A synopsis of the physical and biological limnology and fishery programs within the Alberta oil sands area--revised edition", and "A synopsis of information relating to aquatic ecosystem toxicology within the Alberta

oil sands area--revised edition" have been reviewed and accepted by the Aquatic Fauna Committee.

SUB-PROJECT TITLE
AND DESCRIPTION: AF 4.1.1 Fisheries Monitoring Program--Peace-Athabasca Delta

This project was designed to establish the baseline information on walleye and goldeye fisheries in the Peace-Athabasca Delta in 1975. Spawning success, movement, distribution, age structure, and several other biological characteristics of walleye and goldeye in the Peace-Athabasca Delta were investigated. This information is deemed relevant to the AOSERP studies because of the interrelationships of the water systems in the area.

RESPONSIBLE AGENCY
AND RESEARCHER: Environment Canada, Freshwater Institute, Winnipeg
LGL Environmental Consultants Ltd., Edmonton

STATUS REPORT:

A final report has been received from LGL Ltd., entitled, "Walleye and goldeye fisheries investigations in the Peace-Athabasca Delta--1975", and is being reviewed by the Aquatic Fauna Committee.

SUB-PROJECT TITLE
AND DESCRIPTION: AF 4.2.1 Development of Apparatus and Methods to Monitor Migration of Fish

This project involves tagging quantities of fish in the Athabasca River system, and its tributaries, releasing the fish, and through reports from fishermen regarding captured tagged fish, determine migratory patterns.

RESPONSIBLE AGENCY
AND RESEARCHER: Alberta Recreation, Parks, and Wildlife
Drs. B. Bidgood and H. Baldwin

STATUS REPORT:

Work has proceeded on development and testing of the sonic tags.

SUB-PROJECT TITLE
AND DESCRIPTION: AF 4.3.1. Preliminary Studies on Fall Spawning Fish Species

This project will locate water courses used by fall spawning species and characterize the limnology of the spawning site. It will identify strength of fall spawning runs of fish in selected rivers, characterize the physico/chemical conditions of the spawning area, and will

involve the tagging of a number of fish from various study sites.

RESPONSIBLE AGENCY
AND RESEARCHER: Alberta Recreation, Parks, and Wildlife
Dr. B. Bidgood

STATUS REPORT:

This project has proceeded to the point where equipment and personnel are being obtained.

EXPERT ADVISORY GROUP

To better determine the studies necessary to fulfill the Program's and Committee's objectives, the Aquatic Fauna Committee assembled a group of recognized specialists to provide them with advice on approaches to an investigation of this magnitude. This group had preliminary discussions and a tour of the oil sands site on October 2, 3, 1975. A further meeting was held in Edmonton on November 14, 15, 1975, to determine content, duration, and priorities for studies on aquatic environmental parameters in the area.

The group has submitted its final report to the Aquatic Fauna Committee, and has therefore completed its tasks.

Office of the Chairman

HUMAN ENVIRONMENT
TECHNICAL RESEARCH COMMITTEE

ALBERTA OIL SANDS
ENVIRONMENTAL RESEARCH PROGRAM

23 March 1976

Mr. Milt G. Pahl, Director
Alberta Oil Sands Environmental Research Program
9925 - 107 Street
Edmonton, Alberta

Dear Mr. Pahl:

Re.: Human Environment Committee Goals and Objectives, 1975-76

The Human Environment Technical Research Committee was formed in July 1974 and sponsored by the Northern Development Group associated with Executive Council through the Minister without Portfolio responsible for Indian-Metis Liaison and Northern Development. In March 1975, a new Northern Development Branch was formed within the present Department of Business Development and Tourism, and the Branch continues to sponsor the Committee.

The Human Environment Committee did not meet as a group until April 1975, following the signing of the federal-provincial agreement in February 1975. The initial Committee meetings were especially planned to generate awareness of broad human environmental issues in the Athabasca oil sands region, and to explore the vital connections between human and biophysical research aspects. A particular effort was made to clarify the working relationships between federal, provincial, local governments, and the leaders of the oil sands corporations.

The purpose in researching the human aspects of the environment during the period 1975-78 will be to provide timely information which will facilitate policy recommendations needed to maximize the benefits and minimize the ill-effects of Athabasca oil sands development, by expanding the knowledge of social impacts and integrating human data with biophysical data from the other research Committees of AOSERP.

The objectives have been defined as:

1. To expand the knowledge of social impact phenomena associated with the development of the Athabasca oil sands by
   - identifying, analyzing, and defining the many-pronged impact of the oil sands development on local people;
   - identifying and analyzing the adjustment problems of people in communities affected by resource development, including the social, personal, and psychological aspects;
   - identifying and determining alternative measures to rectify or prevent any negative effects of the oil sands development upon people.

2. To integrate the human and biophysical data so as to meet the ends of the Research Program by
   - gathering essential human baseline data relevant to all Research Committees of AOSERP;
   - identifying, in cooperation with other Technical Research Committees, the areas of interdisciplinary social and biophysical research;
   - determining the extent to which social and biophysical data can be correlated;
   - integrating the human and biophysical data.

During the first year of operation, the Committee has developed seven sub-projects, summaries of which follow. In 1975-76, total funding for the sub-projects was $58,000, all of which came from the Government of Alberta.

Organizationally, steps have been taken to strengthen the functioning of the Committee by adding members to match the scope of the research being contemplated. They include Alberta Culture, Alberta Housing Corporation, and the Northern Alberta Educational Needs Assessment Task Force. A member from Alberta Social Services and Community Health was designated as the Assistant Chairperson for the Committee. In order to facilitate the review of consultants' research designs for sub-project proposals, a Sub-Committee for Review of Research Proposals was formed.

Also, the pace of consultation between the Human Environment Committee and other Technical Research Committees has been accelerated.

Many words of appreciation are due to all the Committee members for their hard work and perseverance in fostering the goals of the human environment research. I would like to use this opportunity to let them know how much of the Committee's success depends on their support.

At the same time, on behalf of the Human Environment Committee, I would like to thank all members of the AOSERP for their effort and cooperation, and hope for even greater an understanding in the coming year of the human aspects of environment.

Yours truly,

Roy L. Liepenburg

Roy L. Liepenburg, Chairman
Human Environment Technical Research Committee.

HUMAN ENVIRONMENT TECHNICAL RESEARCH COMMITTEE

RESEARCH ACTIVITIES, 1975-76

SUB-PROJECT TITLE
AND DESCRIPTION: HE 1.1.1 Structure of a Traditional Baseline Data System

The purpose of the study is to design and develop a comprehensive baseline data system for the Athabasca oil sands area. This system will facilitate the development of a body of knowledge on the human environment system, and the establishment of effective relationships between socio-economic and biophysical data.

RESPONSIBLE AGENCY
AND RESEARCHER: Northern Development Group, Alberta Business Development and Tourism
Population Research Laboratory, University of Alberta

STATUS REPORT:

The contractor is presently working on the project, and is expected to submit the research design by 30 June 1976.

SUB-PROJECT TITLE
AND DESCRIPTION: HE 1.1.2 Feasibility Study Leading to the Development of a Theoretical Indicators Research Model for the AOSERP Project Area

This study will assess the feasibility of a social indicators research model which could be applied to analysis of the quality of life in the Athabasca oil sands area. This information would facilitate the development of a scientific method for monitoring and measuring the changes in social behavior and quality of life that occur as a result of rapid development of resources, industrialization, and urbanization. It also will determine whether and to what extent there exists a discrepancy between the actual quality of life and that perceived by the people of the Athabasca oil sands area as desirable.

RESPONSIBLE AGENCY
AND RESEARCHER: Northern Development Group, Alberta Business Development and Tourism
Urban Research and Consulting Ltd., Edmonton

STATUS REPORT:

This project, which is interrelated with HE 1.1.1, is in the hands of the contractor, and will be completed by 31 March 1977.

SUB-PROJECT TITLE
AND DESCRIPTION: HE 1.2 Literature Review Related to Social Impact and the Attendant Social and Personal Problems Associated with Resource Development

This research will review the professional literature relevant to social impacts and to social and personal problems associated with resource development. The review will focus primarily on three major stages of resource development: exploration, construction of plants, and operation of plants. The aim is to identify the literature dealing with the correlation of human and biophysical factors, and to share this knowledge with the Human Environment Committee members, other Technical Research Committees, with AOSERP generally, and with other users in the federal and provincial governments.

RESPONSIBLE AGENCY
AND RESEARCHER: Northern Development Group, Alberta Business Development and Tourism
Projects Leader and Term Assistant, Human Environment Committee

STATUS REPORT:

The review has been completed and is being circulated to members of the Committee for their appraisal and recommendations.

SUB-PROJECT TITLE
AND DESCRIPTION: HE 1.3 Government Program Delivery System and Resource Development Business Inputs for Resolving Human Problems in the Program Area

The purpose is to identify and analyze those aspects of the quality of life which are determined to a marked degree by the level and quality of services provided to the residents of the oil sands area by the federal, provincial, and local government authorities, and by the resource development businesses. The research will involve a compound analysis of government programs and business inputs and of social indicators.

RESPONSIBLE AGENCY
AND RESEARCHER: Northern Development Group, Alberta Business Development and Tourism

STATUS REPORT:

The sub-project is being reviewed by the Committee, with a view to defining firm objectives

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SUB-PROJECT TITLE
AND DESCRIPTION: HE 2.1 Development of a Research Design Related to Archaeological Studies in the Athabasca Oil Sands of Northeastern Alberta

The archaeological research should help to explain: the origin and the diversification of culture of the present native people; the connection between historical records and oral traditions and the prehistoric peoples; the environmental conditions and limitations of the past.

The research objectives are: to establish a field inventory of archaeological resources; to determine through sampling methods the age, size, and content of archaeological sites located from inventory surveys; to protect or salvage any archaeological sites containing significant remains of the past which are in danger of being destroyed.

RESPONSIBLE AGENCY
AND RESEARCHER: Archaeological Survey of Alberta, Alberta Culture
Dr. J. F. V. Millar, University of Saskatchewan, Saskatoon

STATUS REPORT:

The research design has been completed by Dr. Millar and has been submitted to the Human Environment Committee for their approval.

SUB-PROJECT TITLE
AND DESCRIPTION: HE 2.2 A Survey of Social Preventive, and Rehabilitative Measures within Project Areas and in the Peripheral Areas

This study is to assess and analyze social problems and social preventive and rehabilitation measures within the AOSERP study area and in the peripheral areas. Specifically, this is to establish a relationship between the occurrence of certain social problems and the development of the Athabasca oil sands; and between the incidence of social problems and the reactive ability of social preventive and rehabilitation measures to deal with these problems.

RESPONSIBLE AGENCY
AND RESEARCHER: Northern Development Group, Alberta Business Development and Tourism
Applied Research Associates Ltd., Edmonton

STATUS REPORT:

The contract has been awarded and the research design is to be received by 31 May 1976. The actual development of the study model is to be completed by 30 November 1976.

SUB-PROJECT TITLE
AND DESCRIPTION: HE 2.3 Maximization of Technical Training and Involvement of Area Manpower in the AOSERP Project

The purpose of this sub-project is to develop a working model through which indigenous manpower in various occupational areas may find rewarding and satisfying employment within AOSERP Technical Research Committees. Three main types of workers would be engaged: clerical, para-professional, and professional, with the clerical and research interns being the first to enter training-employment situations. The ultimate aim is to plan systematically for the placement of AOSERP indigenous workers in positions of significance in government agencies and oil sands industries.

RESPONSIBLE AGENCY
AND RESEARCHER: Northern Development Group, Alberta Business Development and Tourism
Dev-Cor Technical Services Inc., Edmonton

STATUS REPORT:

The current level of technical training and involvement of area manpower (indigenous peoples) in the AOSERP project will be determined by the training survey and research design, which is to be submitted by 30 April 1976.

SUB-PROJECT TITLE
AND DESCRIPTION: HE 2.4 Historical Study of the Athabasca Oil Sands

The research is to focus on the history of man's relationships within the environment of the oil sands area. The purpose is to increase our understanding of the historical relationship between the social, economic, cultural, and biophysical aspects of the environment of the past and of the present, and to develop a predictive capability with regard to impacts on the future society in the area.

RESPONSIBLE AGENCY
AND RESEARCHER: Northern Development Group, Alberta Business Development and Tourism
Mr. James M. Parker, Edmonton

STATUS REPORT:

The historian working on the research design will submit the completed study by 30 June 1976. The research design will determine the direction of future work on this sub-project.

SUB-PROJECT TITLE
AND DESCRIPTION: Stackwall Building (Program Cooperative Project)

This experiment in innovative construction methods, suited to the northern climate and using available materials, was conducted to establish a prototype of this type of construction in the Fort McMurray area. The

building's walls are made of two-foot long logs stacked like firewood and mortared in place. Logs of various diameters can be used, thereby eliminating any waste.

RESPONSIBLE AGENCY
AND RESEARCHER: AOSERP Management, in cooperation with
Northeastern Alberta Region Commissioner's Office and
University of Manitoba Northern Housing Committee

STATUS REPORT:

The building is erected at the AOSERP field camp site, and houses the camp's 5000-gallon potable water tank. It is being monitored for heating efficiency, temperature, and moisture.

Office of the Chairman

HYDROGEOLOGY
TECHNICAL RESEARCH COMMITTEE

ALBERTA OIL SANDS
ENVIRONMENTAL RESEARCH PROGRAM

March 15, 1976

TO: Milt G. Pahl, Director,
Alberta Oil Sands
Environmental Research Program,
Penthouse Jarvis Building,
9925 - 107 Street,
EDMONTON, Alberta T5K 2H9

FROM: M. A. Carrigy, Chairman,
Hydrogeology Technical Committee

RE: ANNUAL PROGRESS REPORT

In reply to your request of December 18, 1975 for a progress report on sub-projects of the Hydrogeology Technical Committee, I have to report that the Committee has not developed any sub-programs in sufficient detail to warrant a request for funding this fiscal year.

During the past year the Hydrogeology Technical Committee has continued to guide the joint RCA - ENR groundwater observation well program which is designed to establish a model of the regional groundwater flow in the oil sands area. In addition to this work the Committee has reviewed a number of proposals submitted by consultants, but has not recommended any for AOSERP support. Currently the Committee is deciding whether to institute sub-programs on the hydrogeological factors to be considered in the location of tailings ponds, the effects of mine de-watering and the prediction of post-mining water tables.

Maurice Carrigy,
Chairman
Hydrogeology Technical Committee

MAC:G

RCA - ENR: Alberta Research Council and
Alberta Energy and Natural Resources

HYDROGEOLOGY TECHNICAL RESEARCH COMMITTEE
RESEARCH ACTIVITIES, 1975-76

The information collected as a result of the research activities of the Hydrogeology Technical Research Committee is an integral part of the environmental data base for the AOSERP study area. The findings are very important to the development of the area and its resources, in determining the quality and quantity of groundwater available for human consumption, industrial development, processing, land reclamation and revegetation, and other environmental uses.

Three additional aspects of this Committee which were coordinated with other AOSERP activities were the use of the field research facility, transportation, and communications.

For example, AOSERP fully coordinates the inter-Committee communications and groundwater and surface water gauge inspections. In many instances, gauges have been installed in adjacent locations to monitor groundwater and surface water flow rates, chemical analysis, and water quality.

The data collected will have expanding uses as the work of the entire Program progresses.

Office of the Chairman

HYDROLOGY
TECHNICAL RESEARCH COMMITTEE
100th Avenue Building
10405 - 100 Avenue
Edmonton, Alberta

ALBERTA OIL SANDS
ENVIRONMENTAL RESEARCH PROGRAM

March 25, 1976

Mr. M. Pahl
Director, AOSERP
Penthouse, Jarvis Building
Edmonton, Alberta

Dear Mr. Pahl:

RE: SURFACE WATER HYDROLOGY COMMITTEE
GOALS AND PROGRESS 1975-76

The Hydrology Committee has been guided in its work during 1975-76 by the assumption that the following hydrological problems must be addressed in order that orderly and environmentally sound development of the oil sands may take place:

1. Is there now, and will there be in the future, sufficient water of acceptable quality in the oil sands region for the needs of industry, urban development and reclamation?

2. What are the present and future flood flows and ice conditions associated with streams and rivers in the AOSERP study area?

3. What significant effects will the development of the oil sands have on the natural hydrologic characteristics of the AOSERP study area?

4. What research must be conducted to define water quality parameters that could be altered by development and to determine the expected magnitudes of such alterations; what are the consequences or adverse effects of such alterations and what may be done to minimize adverse effects?

5. What effect will the development of the oil sands have on the sediment load of streams and rivers in the AOSERP study area?

The Purpose of the Committee was redrafted and interpreted to read:

1. The general purpose of all proposed hydrological studies in the AOSERP study area will be to provide the technical knowledge necessary to describe all major characteristics of the existing hydrological regime, to predict the effects of development and to allow for the establishment of guidelines to control environmental impact.

2. To provide the hydrological knowledge necessary for the analysis and design of water use and control systems as related to resource management in the oil sands area.

A recognition that both purposes and day-to-day need for design information would require a base of background water quantity and water quality information prompted immediate effort toward establishing a network of stream gauging stations. A broad network is now in place and only minor additions are expected.

Administrative difficulties prevented a similar commencement in gathering water quality data on a broad basis but several component programs are underway and plans have been laid for an expansion in 1976. Plans for completion of the Committee's assignment over the 10-year period will not be wholly drawn together for two or three years. Initial information from present programs, serious discussion with other committees requiring hydrological information and the concentrated effort of a couple of senior scientific personnel to be employed in 1976 are all a necessary prerequisite to final planning.

Yours truly,

R. K. Deeprose

R. K. Deeprose, P. Eng.
Chairman, Hydrology Committee

RKD/wl

HYDROLOGY TECHNICAL RESEARCH COMMITTEE

RESEARCH ACTIVITIES, 1975-76

SUB-PROJECT TITLE
AND DESCRIPTION: HY 1.1 Surface Water Hydrology--Stream Gauging

The objective is to provide adequate streamflow information for an inventory of the hydrologic resources within the oil sands study area. This hydrologic resource information is required for engineering design purposes, as well as to support other environmental projects in the area.

All gauging stations are instrumented with continuous strip chart recorders. Stream water levels are transmitted to the recorders by float arrangements. With this type of instrumentation, water levels are available on a continuous basis for all gauged sites. The conversion of water level information to stream discharge data is accomplished by developing a stage-discharge relationship for each site.

RESPONSIBLE AGENCY
AND RESEARCHER: Water Survey of Canada, Environment Canada. Mr. M. Spitzer

STATUS REPORT:

The monitoring of streamflow in the oil sands region began in 1957 when Water Survey of Canada established gauging stations on the Athabasca River below Fort McMurray and on the Clearwater River at Draper. Prior to the signing of the AOSERP Agreement in 1975, an additional nine gauging stations had been established in the area, in cooperation with the Alberta Water Resources Branch (now Technical Services Division, Alberta Environment). Task forces of both the federal and provincial governments and a consultant to the provincial government identified a need for additional stream gauging. Thus, after the AOSERP Agreement was signed, 13 additional gauging stations were established.

The end product of hydrometric field data collection is the computation and publication of mean daily discharge data for each gauging station. This data is published annually in "Surface Water Data, Alberta", available upon request to Water Survey of Canada in Calgary.

SUB-PROJECT TITLE
AND DESCRIPTION: HY 2.3 Interaction of Humic Substances with Metallic Elements

Humic materials originating from vegetation, soil, or industrial discharges can chelate (combine) with toxic heavy metals in water to render them more soluble and thus more available to life forms utilizing the water. Thus the ultimate purpose of the project is to predict the effect of oil sands development on the bioavailability of heavy metals in the waters of the Athabasca oil sands area and therefore to produce one measurement of the extent of toxicity problems which may accompany development.

RESPONSIBLE AGENCY
AND RESEARCHER: Water Quality Branch, Environment Canada. Mr. M. Korchinski

STATUS REPORT:

A comprehensive literature search has been completed, as an initial stage in the conduct of this sub-project. Analytical and sampling equipment vital for the data gathering phase of the project has been ordered, and lease access is being arranged.

In February 1976, samples were collected, and on-site field measurements conducted. The samples are being analyzed in Calgary to determine the concentrations of heavy metals, the total ionic strengths, and to quantify and characterize the humic substances.

It is anticipated that work will continue through the next fiscal year.

SUB-PROJECT TITLE
AND DESCRIPTION: HY 3.1 Chemical Analysis of Effluent and Water Samples from the AOSERP Study Area

This sub-project will characterize and quantify into compound classes the total organic component of wastewaters from an existing oil sands extraction plant, including the seepage from the tailings pond and wastewaters potentially disposable to the tailings pond, such as bitumen upgrading effluent and coke storage area runoff.

This information will be used to determine the toxicity levels of various chemical compounds which could enter the water system of the Athabasca oil sands area. The final use will be in the determination of water quality standards.

RESPONSIBLE AGENCY
AND RESEARCHER: Environmental Protection Service, Environment Canada
Kananaskis (Environmental Sciences Centre), University of Calgary

STATUS REPORT:

Samples were collected from three sites: water intake for the extraction plant, upgrading plant effluent, and tailings pond construction water drainage effluent. At the time of collection, no effluent from coke storage was available.

The work, completed in March 1976, evaluated approximately 20 classes of compounds, including metallics, sulphur-containing phosphorous, and chlorinated organics, and employed various analytical techniques.

Once the chemicals are identified, their individual toxicities can be determined and mixtures can be tested to determine if the resultant effect is greater or less than the individual toxicities.

Office of the Chairman

LAND USE
TECHNICAL RESEARCH COMMITTEE

ALBERTA OIL SANDS
ENVIRONMENTAL RESEARCH PROGRAM

26 March 1976

Mr. Milt G. Pahl,
Director,
Alberta Oil Sands Environmental Research Program,
9925 - 107 Street,
Edmonton, Alta.
T5K 2H9

Dear Mr. Pahl:

Re: LAND USE TRC GOALS AND PROGRESS, 1975-76

The Committee sees its purpose as being to integrate research data with government development policy for the evolution of a land use plan, to identify data requirements for regional planning in the oil sands study area, and to study reclamation.

To develop an effective method of fulfilling this purpose, the Committee has established six long-term objectives, namely:

1. to obtain knowledge of factors influencing quality, quantity, distribution, and use of land resources;

2. to identify factors affecting industrial siting, such as transportation and infrastructure;

3. to identify factors affecting town siting, largely with respect to industrial siting and existing population centers;

4. to consider constraints involving land tenure, mineral tenure, zoning, regional planning, recreation, and native land holdings and uses;

5. to identify and evaluate historic and archaeologic sites;

6. to identify future population needs as they relate to land use and geographical considerations, subsequent land use, and the rate, sequence, and timing of development.

Although the Committee realizes that much of its work is dependent upon the baseline data generated by the other seven Committees, there are

cont. . . .

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Environment Canada

Environnement Canada

To: M. G. Pahl
Re: Land Use TRC Goals and Progress

areas of interest and concern which can be acted upon immediately. To this end, a strong liaison has been developed with the Alberta Conservation and Utilization Committee, the Regional Planning Board, and the Northeast Alberta Regional Commissioner's Office.

No projects were commenced in 1975-76.

Yours truly,

H. W. Thiessen

H. W. Thiessen
Chairman,
Land Use Technical Research
Committee, AOSERP

Office of the Chairman

METEOROLOGY AND AIR QUALITY
TECHNICAL RESEARCH COMMITTEE
Atmospheric Environment Service
4905 Dufferin Street
Downsview, Ontario

ALBERTA OIL SANDS
ENVIRONMENTAL RESEARCH PROGRAM

March 25, 1976

Milt G. Pahl, Director,
Alberta Oil Sands Environmental Research Program,
9925 - 107 Street,
Edmonton Alberta. T5K 2H9

Dear Mr. Pahl:

Re: METEOROLOGY AND AIR QUALITY TRC GOALS AND PROGRESS 1975-76

The Meteorology and Air Quality Technical Committee (MAQTRC) held its first meeting on 17 July 1974. The Committee was fortunate to have as a basic working document the Task Force report "The Climatological and Meteorological Research Needs for the Athabasca Tar Sands Area" prepared in late 1973 for the Conservation and Utilization Committee of Alberta Environment. Indeed several members of that Task Force are now on the MAQTRC. The Committee was thus able to quickly formulate its objectives and develop a five year operational plan. The general objectives are (i) to develop for the Alberta Oil Sands area - baseline climatological and air quality data; a better understanding of the relevant atmospheric pollution processes; and simulation models of ambient air quality, air pollutant transport and deposition, and (ii) to provide as a final product information that can be used by other committees and decision makers for land-use planning and air pollution control strategy. The detailed objectives for each of the Committee sub-projects are given in the following report.

The Committee has met a total of eight times and now has several sub-projects well underway. In the initial phase highest priority has been given to implementing the observation systems because of the almost complete lack of useful baseline data in the area. An extensive field observation study was successfully carried out in March 1976 and achieved all major objectives. Some initial research and simple modelling projects are underway and are aimed at giving much-needed preliminary information for further planning both by the MAQTRC and other committees.

The Committee has a total of eight members representing the Alberta and Federal Governments and industry. I would like to express my sincere thanks for their contributions to our activities. Their wide range of expertise has proved invaluable in our deliberations.

Finally, on behalf of the Meteorology and Air Quality Technical Research Committee, I would like to thank all those associated with AOSERP and especially the Program Management team and our Projects Leader, for their excellent cooperation and assistance during the past year.

Yours sincerely,

Peter W. Summers,
Chairman.

Sponsored jointly by

Alberta ENVIRONMENT
Environment Canada
Environnement Canada

METEOROLOGY AND AIR QUALITY TECHNICAL RESEARCH COMMITTEE

RESEARCH ACTIVITIES, 1975-76

SUB-PROJECT TITLE
AND DESCRIPTION: ME 1.1 Meteorological and Climatological Data Acquisition System--Meteorological Tower

The degree of mixing and diffusion of atmospheric emissions and water vapor depends on the stability of the air in the lower levels and the strength of the wind. In order to assess the probable impact of large scale oil sands extraction and upgrading developments in the area north of Fort McMurray, it is necessary to have continuous measurements of temperature and wind at several levels starting from the river valley bottom.

A suitably instrumented meteorological tower would provide such measurements. Interpolation between temperature levels will indicate average lapse rates, frequency and strength of inversions, and times of breakup of nocturnal and valley induced inversions. The wind measurements provide essential data for the determination of diffusion characteristics in the lower levels, and will provide a better insight into the occurrence of fog, and particularly ice fog, conditions.

RESPONSIBLE AGENCY
AND RESEARCHER: Atmospheric Environment Service, Environment Canada. Mr. A. S. Mann

STATUS REPORT:

The 150 m tower was installed in February 1976 and will be instrumented in April. It will be fitted with sensors to measure temperature at five heights (1.5, 10, 30, 90, and 146 m) and to measure winds at three heights (10, 90, and 152 m). The information will be relayed to the AOSERP field camp from the tower site, which is on a portion of Syncrude Canada's Lease 17, on the bank of the Athabasca River.

SUB-PROJECT TITLE
AND DESCRIPTION: ME 1.2 First and Second Order Climatology Data Acquisition System

The current data base for weather conditions near ground level in the oil sands area is insufficient for analysis of circulation patterns, determination of topographic effects, and the development of reliable statistics for industrial development and land use planning. A network of climatological stations to supplement weather information records currently available is required.

RESPONSIBLE AGENCY
AND RESEARCHER: Atmospheric Environment Service, Environment Canada. Mr. A. S. Mann

STATUS REPORT:

Records have been maintained at the Fort McMurray Airport for approximately 30 years; climatological stations have been in place at

three oil sands development locations and Anzac for about two years; and summer records have been collected at 12 Alberta Forest Service lookout locations for about 10 years.

Sites for six stations in the basic permanent climatological network have been selected. Each of these stations will be equipped with automatic temperature, humidity, rainfall, and wind sensors. The data will be acquired over each 10-minute period, and at selected times, the stations will be interrogated, and data from the last period will be telemetered to the AOSERP field camp. The sites for the stations have been prepared and the first units will be installed in May. Arrangements are being made to collect rain samples on an event basis at approximately 20 Alberta Forest Service lookout locations during the summer of 1976.

SUB-PROJECT TITLE
AND DESCRIPTION: ME 1.5 Intensive Observational Field Studies

The permanent data acquisition network provides continuous monitoring of most significant variables over a broad area. In order to relate the data collected by the permanent networks to fine structure motions in the atmosphere and plume behavior, and to relate one measuring system to another, it is desirable to conduct an intensive field study comprising several experiments. By conducting simultaneous experiments of different types, the truth factor of each can be validated and a more complete profile of the meteorological behavior in the oil sands area can be formed.

RESPONSIBLE AGENCY
AND RESEARCHER: Atmospheric Environment Service, Environment Canada. Dr. J. Walmsley; and Pollution Control Division, Alberta Environment. Mr. R. Angle

STATUS REPORT:

The first of a series of intensive field studies was carried out during 2-17 March 1976. Over 30 staff were involved and a wide variety of complex equipment was used to make measurements in the atmospheric boundary layer. Meteorological measurements were taken using a mobile minisonde system, instrumentation on a tethered balloon, an acoustic sounder, and a low-flying aircraft.

Air quality was monitored by an additional station at Fort MacKay, a mobile ground-based correlation spectrometer, plume photography, and airborne plume sampling. Background air filter samples were collected on Birch Mountain for particulate analysis, and approximately 300 snowpack samples were gathered on six radials from an existing oil sands extraction plant for chemical analysis.

All project objectives were achieved, and first indications are that a large quantity of high quality data was obtained. The data are presently being analyzed in Edmonton and Toronto. A final report is expected in the next fiscal year.

SUB-PROJECT TITLE
AND DESCRIPTION: ME 1.6 A Feasibility Study of Radar Precipitation Mapping

The objective of this study is to determine the feasibility of utilizing a weather radar system to track and map precipitation patterns within a radius of approximately 150 miles of Fort McMurray, in order to provide data for the following studies: (1) the precipitation input to hydrologic studies; (2) land reclamation research; (3) pollutant deposition by precipitation scavenging; (4) land use.

RESPONSIBLE AGENCY
AND RESEARCHER: Atmospheric Environment Service, Environment Canada. Mr. A. S. Mann

STATUS REPORT:

Proposals for such a study have been received and are being evaluated by the Meteorology and Air Quality Committee.

SUB-PROJECT TITLE
AND DESCRIPTION: ME 1.7 Very High Resolution Meteorological Satellite Study of Oil Sands Weather--A Feasibility Study

The objective is to evaluate the use of high resolution satellite data (e.g., photography) for the detection and mapping of (1) effluent plumes; (2) extent and movement of fog; (3) development and movement of cloud systems; (4) open water; (5) extent of ice and/or snow cover; and (6) any other relevant features which may be detected.

RESPONSIBLE AGENCY
AND RESEARCHER: Atmospheric Environment Services, Environment Canada
Dr. R. B. Charlton, University of Alberta, Edmonton

STATUS REPORT:

The contract for the study has been awarded and a final report is expected by 31 May 1976.

SUB-PROJECT TITLE
AND DESCRIPTION: ME 2.1 Air Quality Monitoring Network

The development of the oil sands area will result in changes in air quality, both in the vicinity of the extraction and refining plants, at considerable distances. In order to assess the nature and extent of these changes, it is necessary to establish a series of air quality monitoring stations.

These stations will be located in areas of potential oil sands extraction plants, planned human settlements, and at distances considerably removed from the source of emissions. The results of continuous sampling programs may be related to meteorological conditions as a first step in relating potential air pollution and weather conditions.

RESPONSIBLE AGENCY
AND RESEARCHER: Pollution Control Division, Alberta Environment. Mr. R. Angle

STATUS REPORT:

Three ambient air monitoring stations have been installed and are measuring SO_2, H_2S, NO_x/NO_2, CO, O_3, HC, smoke, wind, and particulates. Initially, all continuous data is being recorded on strip charts. However, in succeeding years, it is planned to progressively tie the stations into Alberta Environment's province-wide telemetry system.

SUB-PROJECT TITLE
AND DESCRIPTION: ME 2.2 An Inventory of Sources and Emissions in the AOSERP Study Area

Before research can proceed in a number of areas, it is necessary to identify the pollutants being emitted into the atmosphere, and to determine the quantity and rate of emission of such pollutants. To this end, an inventory of sources and emissions is required.

RESPONSIBLE AGENCY
AND RESEARCHER: Pollution Control Division, Alberta Environment
SNC Tottrup Services Ltd., Edmonton

STATUS REPORT:

The contract has been awarded and work will commence early in the new fiscal year.

SUB-PROJECT TITLE
AND DESCRIPTION: ME 2.3 Plume Dispersion Measurements

The objective of this sub-project is to determine the behavior and geometry of plumes from existing sources by means of aerial measurements during the March field study (see ME 1.5). Plume behavior was examined to discover the relation to meteorological and topographical influences, and to compare measured plume characteristics with those predicted by various models.

RESPONSIBLE AGENCY
AND RESEARCHER: Atmospheric Environment Service, Environment Canada
Intera Environmental Consultants Ltd., Calgary

STATUS REPORT:

The field work has been completed, and the data is being analyzed, in conjunction with the data collected for ME 1.5. A final report is expected early in the new year.

SUB-PROJECT TITLE
AND DESCRIPTION: ME 3.1 Preliminary Air Pollution Climatology

The objective of this sub-project is to analyze existing surface weather observations from the Fort McMurray Airport and data from the upper air stations at Fort Smith and Edmonton, in order to prepare a preliminary climatology of meteorological parameters that are relevant for assessing air pollution potential. The parameters included are: frequency of light winds; persistence of light winds; mixing heights; and ventilation coefficients.

RESPONSIBLE AGENCY
AND RESEARCHER: Atmospheric Environment Service, Environment Canada.
Dr. P. Summers

STATUS REPORT:

The draft report is complete and the final report should be presented to the Committee in May 1976.

SUB-PROJECT TITLE
AND DESCRIPTION: ME 3.3 Preliminary Investigation into the Magnitude of Fog Occurrence and Associated Problems

The objective is to carry out a preliminary study of the fog problem in the oil sands area and, if warranted, recommend a comprehensive study program which would lead to an adequate understanding of the problem in order that a strategy for minimizing adverse effects can be developed.

Heavy fog regularly occurs in the oil sands area--in both the industrial and residential areas.

RESPONSIBLE AGENCY
AND RESEARCHER: Atmospheric Environment Service, Environment Canada
Stanley Associates Engineering Ltd., Edmonton

STATUS REPORT: The contract has been let, and work is proceeding.

SUB-PROJECT TITLE
AND DESCRIPTION: ME 3.4 A Climatology of Low-Level Air Trajectories

This sub-project has as its objective, "to develop a trajectory analysis capability and provide a statistical compilation of horizontal trajectories for the oil sands area, computed on the basis of synoptic wind observations and/or geostrophically computed winds". Information generated by this study will contribute to the best design for air and precipitation sampling networks and in the selection of the best locations for sampling soils and lakes to monitor long-term trends in emission deposition. In addition, it may serve as the basis for a statistical regional dispersion and deposition model.

RESPONSIBLE AGENCY
AND RESEARCHER: Atmospheric Environment Service, Environment Canada
Acres Consulting Services Ltd., Niagara Falls, Ontario

STATUS REPORT:

The contract has been awarded and work is proceeding.

SUB-PROJECT TITLE
AND DESCRIPTION: ME 4.1 Application of the Climatological Dispersion Model

This project is analyzing existing meteorological data of the seasonal and annual mean concentrations of pollutants in order to identify major potential impact areas. Outputs will include seasonal or annual predicted pollutant concentrations around specified existing and future sources, thus identifying potential impact areas for the purpose of locating monitoring sites or biological test plots.

RESPONSIBLE AGENCY
AND RESEARCHER: Atmospheric Environment Service, Environment Canada.
Dr. P. Summers

STATUS REPORT:

The Environmental Protection Agency of the United States has developed a Climatological Dispersion Model (CDM) which Atmospheric Environment Service obtained in late 1975. The model is now running on the AES computer, and initial runs will soon be made on existing climatological data from the oil sands area.

Office of the Chairman

TERRESTRIAL FAUNA
TECHNICAL RESEARCH COMMITTEE

alberta canada

ALBERTA OIL SANDS
ENVIRONMENTAL RESEARCH PROGRAM

April 6, 1976

Milt G. Pahl, Director
Alberta Oil Sands Environmental Research Program
9925 - 107 Street
EDMONTON, Alberta

Dear Mr. Pahl:

RE: Terrestrial Fauna Technical Research Committee Goals and Objectives 1975-76

The Terrestrial Fauna sector addresses itself to five questions which largely dictate the magnitude and direction of its research program. These questions cover the spectrum from current conditions in the oil sands area to post-development management alternatives:-

a) what species currently exist in the oil sands area?
b) what species will be affected by oil sands development and what is the nature of the impact?
c) what methods can be employed to reduce the adverse effects of development and related activities on terrestrial fauna?
d) how can the terrestrial fauna component be incorporated into the post-development reclamation program?
e) what management alternatives are required to maximize the public benefits from the terrestrial fauna component in the pre and post-development period?

The 1975-76 research programs have been undertaken by personnel in Alberta Parks, Recreation and Wildlife, Fish and Wildlife Division, Environment Canada, Canadian Wildlife Service, University of Wisconsin and the University of Calgary. To date, projects have been conducted in the areas of ungulate ecology, avian research and the recreational use of wildlife resources.

As of March 1976, over 150 moose and two caribou have been radio collared in the Rochester, Ft. MacKay and Birch Mountain areas to determine summer/winter ranges, species mobility and predator/prey relationships. The avifauna research consists of two sub-projects, the first of which entails an inventory of the passerines, raptors and waterfowl species in the oil sands area, and a second sub-project to be initiated in 1976-77, which deals with possible effects of human and industrial disturbances on rare and sensitive species. Recreational use is concerned with assessing the consumptive and non-consumptive use of fish and wildlife resources in the OSERP study area, and to evaluate these resources within a rapidly developing socio-economic framework.

Recently proposals have been submitted by the University of Calgary to determine the effect of development on future trapping activities in the Ft. McMurray region. The details of each project are explained in the annual report.

I would also like to express thanks to the members of Program Management, the Terrestrial Fauna Technical Research Committee, and numerous biologists and field researchers whose expertise and assistance have made 1975-76 such a successful year for the Terrestrial Fauna Committee.

Sincerely,

David J. Neave
Chairman
Terrestrial Fauna

TERRESTRIAL FAUNA TECHNICAL RESEARCH COMMITTEE

RESEARCH ACTIVITIES, 1975-76

SUB-PROJECT TITLE
AND DESCRIPTION: TF 1.1.0 Large Mammal Ecology--Ungulate Inventory

The objective of the current ungulate inventory is to determine the baseline density of moose throughout the entire oil sands area. Since moose are the most abundant ungulate in the area, data from this sub-project will be not only important in formulating management guidelines but also instrumental in establishing the basis for an intensive and comprehensive research sub-project on the impact of oil sands development on a moose population.

RESPONSIBLE AGENCY
AND RESEARCHER: Fish and Wildlife Division, Alberta Recreation, Parks, and Wildlife
Inter-disciplinary Systems Ltd., Winnipeg, Manitoba

STATUS REPORT:

Operations commenced in November 1975, with the letting of a contract to design an efficient inventory program which will provide a mean estimate of moose density with a confidence interval about the mean. To test the applicability of the currently accepted procedure for conducting this type of inventory, a 630-square mile study area immediately north of Fort MacKay was selected. Results of the quadrat inventory which is underway will then be subjected to computer analysis. A final design for the entire area will be produced.

SUB-PROJECT TITLE
AND DESCRIPTION: TF 1.1.1 Avifauna--Migratory Birds Inventory

In order to assess potential impact of oil sands development on populations of migratory birds, it is first necessary to ascertain the species of birds and approximate numbers of each species utilizing the area during the migration and breeding periods. Other than localized bird studies sponsored by a development company, and waterfowl studies in the Peace-Athabasca Delta, there are virtually no data available on the numbers and distribution of migratory birds throughout the oil sands area.

RESPONSIBLE AGENCY
AND RESEARCHER: Canadian Wildlife Service, Environment Canada.
Mr. E. Hennan

STATUS REPORT:

The operations of the avifauna group did not get underway formally until September 1975. Prior to that, to ensure continuous data, waterfowl surveys were conducted in the Peace-Athabasca Delta and in the oil sands area by Canadian Wildlife Service.

The avifauna sub-project assumed the responsibility for inventories of waterfowl, passerines, and upland birds. Some non-passerine species will be included in the passerine category.

A color-coded vegetation map of the AOSERP area has been prepared as a guide to location of sample plots for bird census. Also in preparation is a bibliography of literature dealing with bird census techniques, bird ecology and life history, and habitat analysis and description.

SUB-PROJECT TITLE
AND DESCRIPTION: TF 1.1.4 Baseline Inventory--Furbearers

Furbearing animals are a renewable natural resource of considerable economic importance in the AOSERP area. Land use planning and in-depth research programs require baseline inventories identifying furbearer population parameters and their relationships to existing habitat types.

RESPONSIBLE AGENCY
AND RESEARCHER: Fish and Wildlife Division, Alberta Recreation, Parks, and Wildlife. Mr. A. Todd

STATUS REPORT:

There have been significant results from Fish and Wildlife Division efforts in the AOSERP area, largely from the Alberta Land Inventory--Furbearers. This work, initiated on the Waterways mapsheet, has sought to classify, map, and evaluate aquatic landscape units for beaver and muskrat. It has entailed both evaluation and mapping of homogeneous aquatic landscape units, while inventorying present populations and concomitantly gathering data on selected biophysical parameters which may govern the abundance of these semi-aquatic furbearers.

Proposed fur inventory work includes detailed inventory of beaver and muskrat habitats and populations in the remainder of the AOSERP area, detailed inventories of mink and otter throughout the area, extensive red squirrel inventories in representative major habitats, and a generalized evaluation and classification of the area for the remaining (terrestrial) carnivorous furbearers.

SUB-PROJECT TITLE
AND DESCRIPTION: TF 1.1.2 Rare and Sensitive Species

In the ecological assessments and impact studies which are necessary in the oil sands area, it is clear that surveys must be carried out to determine the effects on endangered, potentially threatened, and sensitive species. Initial assessments will include the oil sands study area and the areas immediately adjacent to the area which will receive recreational impact following development. Additional assessments may be required in areas which will be affected due to transportation, routing, and logistic support.

These studies would relate to generally declining species as well as to species which may be locally endangered because of sensitivity to human interference. In this context, the definition will include raptorial birds (peregrine falcons, golden eagle, bald eagle, osprey, merlin), colonial birds (pelican, tern species, gull species), and other sensitive

species (cranes, loons).

RESPONSIBLE AGENCY
AND RESEARCHER: Canadian Wildlife Service, Environment Canada. Mr. R. Fyfe

STATUS REPORT:

The Canadian Wildlife Service has been involved in toxic chemical and raptor research since 1975; it has been conducting population inventories and has assessed the effects of toxic chemicals on these birds in western Canada and the Arctic. Many of the field techniques for a survey of this magnitude have been worked out; however, additional biological information is needed on the northern populations relative to prey species abundance, hunting ranges, and phenology.

On 8 July 1975, the initial inventory of rare and sensitive birds was initiated in the AOSERP study area and in those adjacent areas with recreational potential. The preliminary survey was successful in locating some active and potentially active nesting sites and breeding colonies; in identifying breeding and non-breeding pairs and single birds; and in banding and recording some young. The study will continue in the next year.

SUB-PROJECT TITLE
AND DESCRIPTION: TF 1.3 Recreational Use of Wildlife and Fisheries

Little is known of the current levels of consumptive and non-consumptive use of the wildlife resource in the oil sands development area. It is possible that, as disturbance in the area increases, with concomitant dispersal of natural wildlife populations (both mammalian and avian), loss of wildlife-related recreational opportunity to residents of the area is judged sufficiently significant to require priorization for future use.

RESPONSIBLE AGENCY
AND RESEARCHER: Fish and Wildlife Division, Alberta Recreation, Parks, and Wildlife. Miss C. Ward

STATUS REPORT:

Work has commenced on the design of questionnaires and interview questions to be used, as well as sampling techniques. Sampling will involve randomly selecting resident and non-resident hunters and anglers for receipt of questionnaires; interviews will be used extensively in the AOSERP study area. Consumptive and non-consumptive use of the resource will be determined.

Coordination and communication with the Aquatic Fauna and Human Environment Committees with regard to this survey is being effected.

SUB-PROJECT TITLE
AND DESCRIPTION: AF 2.1 Moose Ecology

The need to study moose, caribou, bear and wolf populations is predicated on three assumptions: (1) The physical disturbances to the

landscape and the additional human activity attending oil sands development will have significant impacts on the population dynamics and ecology of big game species in the region. (2) Populations of big game in and around the oil sands area constitute renewable natural resources having economic, social, recreational, aesthetic, and scientific values which justify their preservation. (3) Preservation and management of this big game resource will require additional information on: (a) the natural control and regulation of populations; (b) interactions with man as a hunter and/or trapper; and (c) effects of disturbances from oil sands development on population dynamics.

RESPONSIBLE AGENCY
AND RESEARCHER: Fish and Wildlife Division, Alberta Recreation, Parks, and Wildlife. Mr. G. Kemp

STATUS REPORT:

Currently, studies are being undertaken in three areas: Fort MacKay moose study, Rochester moose study, and Swan Hills wolf ecology.

In the Fort Hills area (Fort MacKay), a moose research project has been established. The study area includes the oil leases most likely to be developed earliest, as well as the likely future townsites, and areas that will remain relatively undeveloped. The moose population contained within the study area will undergo a continuum of disturbance, ranging from complete clearing of leased land to areas untouched except for occasional cutlines.

Moose are located by helicopter and fixed wing aircraft flights, then tagged and radio-collared in order to follow their feeding and migration patterns.

The Rochester moose study was initiated with the tagging of 97 moose--67 marked and 30 radio-collared. The Rochester study area is unique in that distributional and demographic factors can be studied in relation to gradients of human activity on choice range with no hunting or wolf predation.

Concurrently, a wolf population in the Swan Hills area of central Alberta is being studied in an effort to determine wolf-moose-human interactions and wolf population dynamics. In addition to their economic importance as a furbearer, wolves are the major predators of moose, the primary big game species in northern Alberta. Since 1971, the Fish and Wildlife Division has been conducting a radiotelemetry study of moose in the area, which has provided both distribution information and population estimates. Hopefully, this study will enable the Program to more closely examine direct wolf-moose interactions.

Two wolves in two packs have been radio-collared to ascertain wolf numbers and densities, pack size, movements, food habits, and mortality factors. Trapping continued throughout the winter and spring to ensure that a sufficient number of animals are monitored. Initial efforts have been made to establish a wolf project in the Fort MacKay area.

SUB-PROJECT TITLE
AND DESCRIPTION: TF 2.6 Relationships between Habitat Strata, Forages, and Carrying Capacity of Moose Range in Northern Alberta

Moose are the primary ungulate species in the oil sands. In order to encourage these animals to utilize the area after development, detailed information about range preferences, quantity, and quality in the mixed wood forest section of Alberta is required. This information is not presently available.

RESPONSIBLE AGENCY
AND RESEARCHER: Fish and Wildlife Division, Alberta Recreation, Parks, and Wildlife. Mr. B. Gilbert

STATUS REPORT:

Research areas for this sub-project have been within the AOSERP study area and at the Ministik Lake Bird Sanctuary southeast of Edmonton. Most of the work has been conducted at the Ministik Sanctuary. The AOSERP study area has been examined for selection of potential study sites, using the existing Fish and Wildlife Division moose aerial survey data.

Currently, 10 radio-collared moose are being relocated at Ministik to gather data on movement, habitat selection, and location of feeding sites. The same data is also being obtained by tracking through snow. When feeding sites are located, they are examined for use of plant species to determine feeding habits.

Immediate plans for the AOSERP study area include aerial and ground reconaissance to delineate a sub-project study site within this area.

Office of the Chairman

VEGETATION
TECHNICAL RESEARCH COMMITTEE

ALBERTA OIL SANDS
ENVIRONMENTAL RESEARCH PROGRAM

April 1, 1976

Mr. Milt Pahl, Director
Oil Sands Environmental Research Program
Penthouse - Jarvis Building
9925 - 107 Street
Edmonton, Alberta

Dear Mr. Pahl:

I am writing to provide some background information regarding initiation and development of the Vegetation Technical Research Committee for the AOSERP First Annual Report.

The technical committee was established as part of the Oil Sands Environmental Research Program in June of 1974.

Membership on the Committee originally consisted of representatives from:

The Government of Canada:	Department of Environment Canadian Forestry Service
The Government of Alberta:	Departments of Agriculture and Lands and Forests* Research Council of Alberta
The University of Alberta:*	Department of Botany
The Oil Sands Industry:*	Syncrude of Canada Ltd.
The Oil and Gas Consulting Industry:*	Canadian Arctic Gas.

*Representation from these agencies changed in 1975. The Oil and Gas Consulting Industry is no longer represented. The University of Alberta is now represented also by the Institute of Pedology. The Oil Sands Industry is now represented by BP Exploration Canada Limited. The Forest Service is no longer a division in Department of Lands and Forests but is now a division in the Department of Energy and Natural Resources.

The Committee first met on July 25, 1974, and established the basic role and direction for vegetation research under the auspices of the Committee. It was agreed that the Committee would concern itself with research into:

1. the effects that Oil Sands development is likely to have on the existing vegetation and ways and means of avoiding or overcoming any negative impacts, and;

2. the use of vegetation in the reclamation of lands disturbed as a consequence of Oil Sands development.

It was agreed that the Committee would direct its research on the assumption that the goals for revegetation in the Oil Sands area would be to:

1. stabilize the soil surface and;

2. establish self-sustaining plant communities, and

3. establish plant communities which will be as useful as those presently existing in the area.

The committee identified 22 specific areas where research was needed and developed research proposals to resolve those of highest priority.

At additional meetings in August and October of 1974, research projects were finalized, appropriate researchers located, and by December 1974, a program had been established and budgeted for the 1975 field season.

The final committee budget for 1975 was $775,000. This was broken down into seven major program areas, incorporating most of the 22 individual research projects.

The actual research program got off to a vigorous start in 1975. Progress to date for each of the major research project groupings is summarized by sub-project on the following pages.

Sincerely,

F. W. McDougall, Chairman
Vegetation Technical Research Committee

VEGETATION TECHNICAL RESEARCH COMMITTEE

RESEARCH ACTIVITIES, 1975-76

SUB-PROJECT TITLE
AND DESCRIPTION: VE 1 Literature Review

The purpose of this sub-project is to compile existing information relevant to revegetation of the oil sands area, including titles obtainable through existing bibliographic access sources and readily available documents from industry and government. A background data base is vital to research proposals.

RESPONSIBLE AGENCY
AND RESEARCHER: Alberta Research Council

STATUS REPORT:

Very little was done with respect to an overall literature survey, as Alberta Oil Sands Technology and Research Authority (AOSTRA) was setting up a computerized scientific index and each project group preferred to do its own literature review.

SUB-PROJECT TITLE
AND DESCRIPTION: VE 2 Landscape Classification and Mapping

This sub-project will provide baseline premining inventory data on soils, vegetation, and landforms for the oil sands area, which will enable future research to determine the extent and degree of change.

RESPONSIBLE AGENCY
AND RESEARCHER: Alberta Energy and Natural Resources
Dr. P. W. Stringer, University of Alberta
Reid, Collins and Associates, Edmonton

STATUS REPORT:

Work began on an inventory of the vegetation in the oil sands area. Two studies were completed and reported on by Dr. Stringer: "A Preliminary Vegetation Survey of the Alberta Oil Sands Area", and "A Preliminary Vegetation Survey of the Alberta Oil Sands Area--Bryophytes and Lichen". These reports have been presented to the Vegetation Committee for approval.

Dr. Stringer also was able to collect a comprehensive set of plant specimens and place these in the University of Alberta herbarium.

Work continued on the development of a design for a complete Vegetation and Terrain Inventory for the oil sands area. The consulting firm which was awarded the contract completed a design study and submitted its report in December 1975.

SUB-PROJECT TITLE
AND DESCRIPTION: VE 3 Effects of SO_2 on Vegetation

Sulphur dioxide in sufficient concentrations is toxic to vegetation and causes degradation in soils and water. There is a likelihood that with extensive development, amounts in excess of 2000 tons per day will ultimately be discharged into the atmosphere associated with the oil sands region. Other pollutants will be released as well, including nitrogen oxides, ozone, and the trace metal, vanadium. There is a potential for considerable harm to the environment resulting from those releases. Diagnostic, sensitivity, and tolerance information as related to vegetation and soils is presently inadequate to detect and appraise impact of those pollutants and to prescribe treatment should such needs develop.

RESPONSIBLE AGENCY
AND RESEARCHER: Northern Forest Research Centre, Environment Canada.
Dr. S. Malhotra

STATUS REPORT:

VE 3.1 Symptomology of SO_2 injury to vegetation

Extensive collections have been assembled of herbarium specimens and photographs of SO_2-injured vegetation, with notes on probable conditions of exposure. Conditions of time and concentration of SO_2 are rarely if ever available. For further progress, control of these two factors is essential within conditions of controlled climate. To accomplish this, a fumigation chamber has been designed and is being constructed.

VE 3.2 Threshold levels of SO_2 injury and species tolerances

This sub-project will also require the use of the fumigation chamber being constructed for VE 3.1, since the objectives of this study require the most careful control of exposure conditions.

VE 3.3 Physiology and mechanisms of SO_2 injury

Available literature has been assembled and reviewed. Substantial experimentation has been carried out with pine needles exposed to SO_2 in aqueous solution, with results showing effects on photosynthetic pigments, enzyme activity, subcellular particle structures, Hill reaction of isolated chloroplasts, amino acid and organic acid content, and lipid composition of cells.

VE 3.4 Ecological benchmarking and biomonitoring for detection of SO_2 effects on vegetation and soils

Permanent field plots have been established at eight selected ecotones in the Fort McMurray area. Photographic documentation of vegetative cover has been collected for 1973 (three plots) and 1974 (eight plots). Preliminary species inventories and herbarium collections have been made.

In 1975-76 the level of data collection on established sites was increased to include species densities, numbers, and distributions. Herbarium collections were added, species were collected to conduct trials as to their suitability as biomonitoring agents, and soil classification on sites was initiated. An examination of forest vegetation was made to evaluate the impact of controlled emergency flaring procedures conducted

at an oil sands operation.

SUB-PROJECT TITLE
AND DESCRIPTION: VE 4.1 Study of the General Properties and Reactions of Disturbed and Non-Disturbed Soil Materials

Basic soils data are required for disturbed and undisturbed soils in the oil sands, and for use in developing sound management programs and to ensure successful long-term revegetation of spoil piles, tailing piles, mined areas, and dikes.

This sub-project will characterize in detail soil materials to be reclaimed and will develop ways of improving soil factors affecting the eventual production of a stable soil-plant system.

RESPONSIBLE AGENCY
AND RESEARCHER: Department of Soil Science (Alberta Institute of Pedology), University of Alberta. Dr. F. Cook

STATUS REPORT:

The Department of Soil Sciences has acquired a mass spectrometer and is constructing specialized equipment, such as lysimeters, to enable extensive analytical work to proceed. Bulk samples of tailings sand, native peat, disturbed and undisturbed tills, and natural surficial sands have been collected from the oil sands area and analyzed for: particle size distribution, organic and inorganic carbon, nitrogen, pH, microbes.

SUB-PROJECT TITLE
AND DESCRIPTION: VE 4.2 Impact of SO_2 on Soils, and SO_2 Transformation in Soils

Evaluation of the SO_2 uptake by soils in the oil sands area, and well beyond, has a high priority in predicting the short and long-term effects of the oil sands operation.

This research will determine the mechanism and rate of SO_2 uptake by soils; will find the effect this has on soil pH, available sulphur and biological activity; and will determine extent of SO_2 damage to soils and countermeasures against this damage.

RESPONSIBLE AGENCY
AND RESEARCHER: Department of Soil Science (Alberta Institute of Pedology), University of Alberta. Dr. M. Nyborg

STATUS REPORT:

In studying the impact of SO_2 on soils, a number of cannisters containing specified soil material have been set out in the Fort McMurray area and changes in soil acidity and sulphur content are being measured. Accompanying data have been obtained in regard to acidity and sulphur concentration in rainfall, and in the flow of water down tree stems in the area.

SUB-PROJECT TITLE
AND DESCRIPTION: VE 5 Characterization and Utilization of Peat in the Oil Sands Area

Peat is the only organic material naturally available for rebuilding soil fertility after mining. This project will identify the baseline state of peat at a limited number of in situ sites and industry storage piles, in terms of classification and physical and chemical properties. It will identify the nature and extent of interactions between the environment and stored peat. This information will permit prediction of changes in peat characteristics with handling and storage, and if peat quality is found to deteriorate during storage, will investigate alternate methods of storage and handling.

RESPONSIBLE AGENCY
AND RESEARCHER: Soils Division, Alberta Research Council
Department of Soil Science (Alberta Institute of Pedology), University of Alberta. Mr. J. D. Lindsay

STATUS REPORT:

The Alberta Research Council has carried out an extensive literature review in respect to this study. The Council has also selected and classified field study sites and has analyzed peat samples in its laboratory for cation exchange capacity, exchangeable cations, pH, total nitrogen, total carbon, and ash content. The physical characteristics of peat in the area have been studied in respect to moisture content, specific gravity, bulk density, air and water capacity, pore volume and fiber content, and for bacteria and fungi populations. Storage procedures used by operating oil sands companies have been studied. A scintillation counter has been purchased for use by this project and also VE 4.

SUB-PROJECT TITLE
AND DESCRIPTION: VE 6 Long-term Prediction of Vegetation Performance for Dike Management

The purpose of this sub-project is to develop and evaluate potential management strategies for long-term maintenance of vegetative cover on the steep-sided dikes created by surface mining operations in the Athabasca oil sands. The changing environmental conditions and responses by vegetation to those conditions will be monitored, initially over a two-year period.

RESPONSIBLE AGENCY
AND RESEARCHER: Alberta Energy and Natural Resources
Dr. L. C. Bliss, Department of Botany, University of Alberta

STATUS REPORT:

The Department of Botany has begun work on this project by establishing a study into plant physiology of existing native vegetation in an undisturbed forest microenvironment on a sandy site near Richardson Fire Tower. A detailed description has been made of the vegetation on the study site; the site has been instrumented for intensive monitoring of microclimatic factors; soil samples have been collected for analysis

by the soils group; and tree water potential and respiration rates have been measured. Some specialized "controlled climate" chambers have been constructed in the Department of Botany to facilitate the measurement of plant response to climatic change. Some computer modelling of results is underway.

SUB-PROJECT TITLE
AND DESCRIPTION: VE 7.1 Reclamation for Afforestation by Suitable Native and Introduced Tree and Shrub Species

Testing of suitable native and introduced tree and shrub species for oil sands reclamation is necessary in order to determine possible timber production, watershed protection, and wildlife habitat improvement. The experiments being conducted within this sub-project will find the best-suited trees and shrubs for oil sands reclamation work.

RESPONSIBLE AGENCY
AND RESEARCHER: Alberta Forest Service, Alberta Energy and Natural Resources, Mr. J. Selner

STATUS REPORT:

Field reclamation trials were undertaken during 1975 by Alberta Forest Service on a developed oil sands lease. A total of more than 20,000 trees and shrubs (30 species) were planted on 211 plots situated on a variety of disturbed sites, in order to assess the relative suitability of the different species for reclamation.

SUB-PROJECT TITLE
AND DESCRIPTION: VE 7.2 Controlled Environmental Tests of Species Suitable for Revegetation

VE 7.3 Field Trials to Test Plant Communities

VE 7.4 Technology of Seed Production and Handling

These three sub-projects were designed to (a) provide preliminary information about the adaptability of selected ecotypes and landraces to certain environmental conditions and soil types; (b) provide the information necessary to recommend plant communities for revegetation of disturbed areas; (c) provide the information for seed production and handling of native grasses, legumes, and shrubs.

RESPONSIBLE AGENCY
AND RESEARCHER: Botany Section, Plant Industry Laboratory, Alberta Agriculture. Dr. H. Vaartnou

STATUS REPORT:

The Department of Agriculture conducted greenhouse tests of a variety of native and naturalized plant species on tailings sand and samples of northern Alberta soil types. They also established a number of

field test plots throughout Alberta on which native and naturalized plant species were planted in order to assess their adaptability to a variety of soil and climatic conditions. A total of five test sites were established to measure seed production from native and naturalized species under different soil and climatic conditions. Seed was collected from 140 native grass ecotypes, 90 native legume ecotypes, and 40 native shrub species.

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

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Hon. Jean Marchand
Minister of the Environment
Government of Canada

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